IMPOVERISHED FRESHWATER FAUNA OF EASTER ISLAND

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INTRODUCTION

The fauna and flora of Easter Island is not only impoverished; the share of invasive species is impressive (Campos and Pena 1973; Desender and Baert 1996). The freshwater microfauna of the island had been neglected until recently. The presence of mosquitoes was, of course, known, and had given rise to the introduction of an insectivorous fish that may have had effects on other faunal elements as well. Yet, among insects, it is reasonably certain that only a single dragonfly species (*Pantala flavescens*) ever existed on the island. The fact that, at times, it shows an atypical behavior here (Dumont and Verschuren 1991) does not exclude the possibility that this long-ranging migrant, which may move with ocean-going ships, was a recent arrival on the island. The single aquatic beetle species known from Easter Island, *Bidessus skottsbergi* was described from Rano Kao in 1924 (Zimmerman 1924) prior to the introduction of the fish. It has not been collected since. It status as an endemic is under question: Desender and Baert (1997) argue that Kuschel (1963) was probably right in considering it synonymous to an Australian species.

Here we summarize what is known about the aquatic biota on the island, including algae, and attempt to arrive at a synthesis.

THE AQUATIC MICROFLORA AND FAUNA

Algae

Cocquyt (1991) identified 70 diatom species from the three main lakes of the islands (Rano Raraku, Rano Aroi, and Rano Kau), and from a large number of puddles and ponds. About 90% were cosmopolitan, planet-wide in occurrence, and none were truly pelagic species. An overwhelming majority was associated with plant substrata, and tropical species were few. Two species were of American origin, one possibly Australian, and one was subantarctic.

Dr C. Cocquyt (Ghent University) has now added identifications of some other algae to the list. These include a large desmid, *Closterium acerosum*, and cf. *Pleurotaenium nodosum*. Both are cosmopolitan. A filamentous *Oedogonium* sp. also occurs rather commonly, and at least two species of *Euglena*, the cosmopolitan *Euglena spirogyra*, and *Euglena* sp. are present in a series of samples collected in 1990.

All in all this is a meager inventory. Rich lakes may house well over 1,000 species of algae, and although the inventory of Easter Island is certainly incomplete, it seems that its species richness is on the order 7-10% of what one should expect in a continental setting.

Sponges

Sponge spicules, ascribed to a *Meyenia*-like sponge (det. Dr A. D. Harrison) were recorded from the upper layers of sediment by Dumont et al. (1998). There is currently doubt as to the nature of these "spicules". Vrydagh et al. (n.d.) argue that all of them might well be phytoliths of *nga'atu (Scirpus,* or *totora).* Arguments for this position include the facts that no sponge microfossils other than "spicules" have been found, that no extant sponges could be ascertained on the island, and that the vertical distribution of the "spicules" exactly matches that of the macroremains of *nga'atu* .

Rotifera

Segers and Dumont (1993) inventoried the rotifers (wheel animalcules). Only 19 species were recorded, 17 of which are among the most common cosmopolitan species of the planet. No pelagic species were encountered.

Plathelminthes

Some pools contained rather large number of a contracted, chain-forming plathelminth (flatworms), that could not be identified beyond the level of the Order Catenulida. In addition, damp sites, like the space under stones in humid environments yielded specimens of *Bipalium kewense* Moseley, a predatory land planarian (det. Dr Janet Moore, Cambridge) of tropicopolitan distribution that, with some help of man, conquered Polynesia in the 1980s.

Crustacea

The microcrustacea are especially reduced in species richness. A single anomopod cladoceran, *Alona weinecki*, occurs, which is almost certainly an introduction from the subantarctic (Dumont et al. 1998). One species of cyclopoid copepod, *Paracyclops fimbriatus*, and three species of ostracods (the cosmopolitan *Heterocypris incongruens*, the tropicopolitan *Cypretta seurati*, and *Sarscypridopsis* sp. of presumed subantarctic origin) were recorded by Dumont and Martens (1996). The identification of the copepod was recently corrected by Karaytug (1999) to *P. chiltoni*. However, like *P. fimbriatus* this too is a cosmopolitan species. Of the three species of ostracods, one is a wide-ranging parthenogen, the second is of South American origin, and the third is a subantarctic species.

Some decapods from a coastal saltwater pool of Vai Paku, close to La Pérouse bay, should also be mentioned. The site is a rock pool, lying just behind a rim of coastal boulders, probably with underground incursion of marine water. Here, we found swarms of a shrimp, varying in color from pure white to blood red. Wherever it has been found, this species, *Metabetaeus minutus* (Whitelegge) (det. L. B. Holthuis, Leiden), occupies stony (often coral rubble) parts of mangrove swamps, and re-

treats into holes in the coral at low tide, to re-emerge in large numbers at high tide. This exactly conforms to my observations on Easter Island. Its geographic range spans a number of island and atolls in the central Pacific (Holthuis 1963). It is first reported here from Easter Island. The same pool was also inhabited by numerous burrowing crabs, pertaining to *Ptychognathus easteranus*, the only endemic crustacean thus far known from Easter Island (Garth 1973).

Insecta

Pantala flavescens and *Bidessus skottsbergi* have already been mentioned. I have not found an identification of the mosquito of the island, but presume it is *Culex* sp.; in addition, the only insects seen were chironomid larvae. Miss Hilde Eggermont (Ghent University) identified their larvae to genus, and found that they pertain to at least four taxa: *Chironomus* sp., *Tanytarsus* sp., *Limnophyes* sp., and *Coryneura/Thienemaniella* sp. These four genera are of cosmopolitan occurrence. A "normal" lake would yield about 30 or more species.

DISCUSSION

The island aquatic fauna and flora conform to their terrestrial counterparts in being impoverished, and composed of mainly cosmopolitan species. Cosmopolitan species are typically hardy, and easy to be transported by man. It is likely that most of them were imported in the few centuries that man started visiting the island regularly. This view of things is, in fact, reinforced by the few non-cosmopolitan species that occur. Those that persist as microfossils in the sediments can all be shown to have arrived on the island between the seventeenth century and today (Dumont et al. 1998).

The degree of impoverishment can be judged in only few groups. Rotifers, for example, are now known to be represented by about 250 species in any well-differentiated tropical freshwater lake (Dumont and Martens 1996). The impoverishment of the Easter Island fauna of that group can thus be estimated at about 92%. Similar estimates for a group like the chironomids are more uncertain, but might be of the order of 85%. The number of algal species per lake, as mentioned earlier, may reach over 1,000 species, and so the situation here seems more or less similar as in animals. Cladocerans are difficult to judge, because the one species present is an introduction. Typical lakes have around 50 species, however.

Many groups are absent altogether: Cnidaria, Ectoprocta, freshwater Mollusca, Oligochaeta, Hirudinea, Hemiptera, Trichoptera, Ephemeroptera, Isopoda, Amphipoda, and most Branchiopoda, to name only the most important.

The reasons for this impoverishment are well known, and have been summarized by Segers and Dumont (1993): the island is too small a target, too far away from any continent, and has existed for a too short time to have become successfully colonized. However, there are oceanic islands that acquire a sizeable portion of their inland water diversity from the ocean. A condition is that permanent rivers must drain the island, preferably forming a small estuary. As well, fish as a variety of invertebrate groups (worms, crustaceans) may then gradually invade the fresh waters of such islands, and evolve into secondary freshwater species. Easter Island, however, is too arid for this, and has no major surface freshwater reaching the ocean. But the pool at Vai Paku may offer insight into the way this mechanism first evolves, and constitute a sort of a bridgehead through which marine species timidly attempt to penetrate the island.

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